

Applicant: Ishiduka et al.
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Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A positive-type resist composition for liquid immersion lithography comprising:

a resin component (A), increasing alkali-solubility by acid action; and
an acid generator component (B), generating acid by exposure,
wherein, the resin component (A) contains at least one acrylic ester constitutional unit (a1), and one (meth)acrylic ester constitutional unit (a2) having acid dissociable, dissolution inhibiting group,

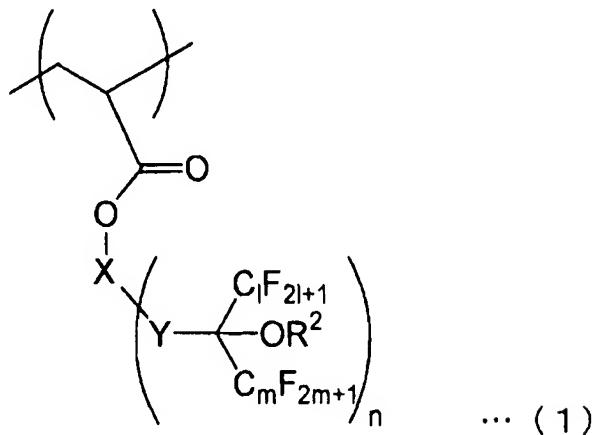
the constitutional unit (a1) consisting of a cyclic group bonded to an acrylic ester of the constitutional unit (a1), and a fluoro organic group bonded to the cyclic group, and

the fluoro organic group being formed by at least partially substituting hydrogen atoms of an organic group with fluorine atoms, and having a substituted or unsubstituted alcoholic hydroxyl group, and

in the resin component (A), the constitutional unit induced from methacrylic ester is 20 to 80 mol %, and the constitutional unit induced from acrylic ester is 20 to 80 mol % relative to the total amount of these constitutional units.

2. (Original) The positive-type resist composition for liquid immersion lithography according to Claim 1, wherein the constitutional unit (a1) is expressed by the following general formula (1),

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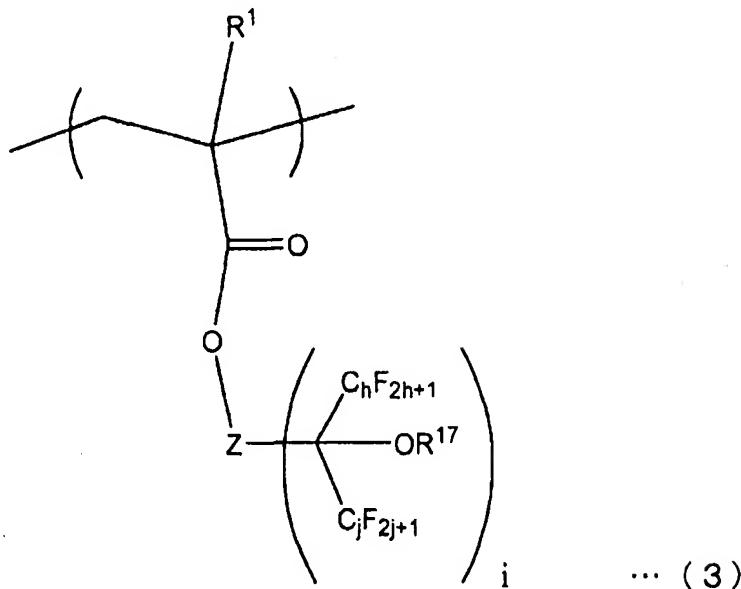
in which, X represents a divalent or trivalent cyclic group; and Y represents a divalent alkylene or alkyloxy group having 1 to 6 carbons; R² represents a hydrogen atom, a chain, a branched or a cyclic alkyloxymethyl group having 1 to 15 carbons; l and m respectively, are integers from 1 to 5; and n is an integer of 1 or 2.

3. (Cancelled)

4. (Previously presented) The positive-type resist composition for liquid immersion lithography according to Claim 1, wherein the resin component (A) further comprises: one or more constitutional units (a3), which are different from the constitutional units (a1) and (a2).

5. (Original) The positive-type resist composition for liquid immersion lithography according to Claim 4, wherein the unit (a3) is the constitutional unit (a4) induced from a (meth)acrylic acid having a monocyclic or a polycyclic group containing lactone.

6. (Original) The positive-type resist composition for liquid immersion lithography according to Claim 4, wherein the unit (a3) is expressed by the general formula (3),



in which, Z represents a divalent or a trivalent cyclic group; R¹ represents a hydrogen atom or a methyl group; R¹⁷ represents a hydrogen atom, a chain, a branched or a cyclic alkyloxymethyl group having 1 to 15 carbons; and h and j respectively, are integers from 1 to 5; and i is an integer of 1 or 2.

7. (Previously presented) The positive-type resist composition for liquid immersion lithography according to Claim 1, wherein a cyclic group in the constitutional unit (a1) is an aliphatic cyclic group.

8. (Original) The resist composition for liquid immersion lithography according to Claim 7, wherein the alicyclic group is a polycyclic aliphatic hydrocarbon group.

9. (Original) The resist composition for liquid immersion lithography according to Claim 8, wherein the polycyclic aliphatic hydrocarbon group is a norbolanyl group.

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10. (Previously presented) The resist composition for liquid immersion lithography according to Claim 1, wherein an acid dissociable, dissolution inhibiting group in the constitutional unit (a2) is a polycyclic aliphatic hydrocarbon group.

11. (Original) The resist composition for liquid immersion lithography according to Claim 10, wherein the polycyclic aliphatic hydrocarbon group is an adamanyl group.

12. (Previously presented) The resist composition for liquid immersion lithography according to Claim 1, wherein a medium for liquid immersion lithography is water.

13. (Previously presented) A method for forming a resist pattern using a liquid immersion lithography process comprising the steps of:

forming a photoresist film onto a substrate by using at least the positive-type resist composition according to Claim 1;

disposing an immersion solvent onto the substrate on which the resist film is laminated;

selectively exposing the resist film via the immersion fluid;

conducting a heat process as required; and

developing the resist film.

14. (New) A positive-type resist composition for liquid immersion lithography comprising:

a resin component (A), increasing alkali-solubility by acid action; and

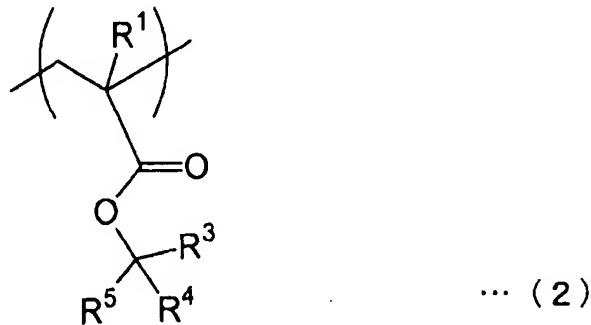
an acid generator component (B), generating acid by exposure,

wherein, the resin component (A) contains at least one acrylic ester constitutional unit (a1), and one (meth)acrylic ester constitutional unit (a2) having acid dissociable, dissolution inhibiting group,

the constitutional unit (a1) consisting of a cyclic group bonded to an acrylic ester of the constitutional unit (a1), and a fluoro organic group bonded to the cyclic group,

the fluoro organic group being formed by at least partially substituting hydrogen atoms of an organic group with fluorine atoms, and having a substituted or unsubstituted alcoholic hydroxyl group,

the constitutional unit (a2) is expressed by the following general formula (2),



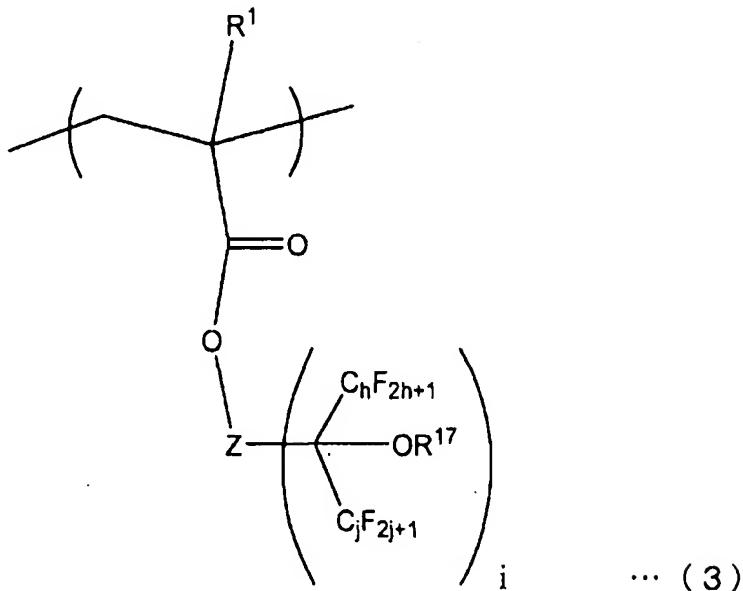
in which, R¹ represents a hydrogen atom or a methyl group; R³ to R⁵ represents an alkyl group having 1 to 10 carbons, which may be the same or different from each other; and at least two alkyl groups among these may bind to form the cyclic groups and

in the resin component (A), the constitutional unit induced from methacrylic ester is 20 to 80 mol %, and the constitutional unit induced from acrylic ester is 20 to 80 mol % relative to the total amount of these constitutional units.

15. (New) The positive-type resist composition for liquid immersion lithography according to Claim 14, wherein the resin component (A) further comprises: one or more constitutional units (a3), which are different from the constitutional units (a1) and (a2).

16. (New) The positive-type resist composition for liquid immersion lithography according to Claim 15, wherein the unit (a3) is the constitutional unit (a4) induced from a (meth)acrylic acid having a monocyclic or a polycyclic group containing lactone.

17. (New) The positive-type resist composition for liquid immersion lithography according to Claim 15, wherein the unit (a3) is expressed by the general formula (3),



in which, Z represents a divalent or a trivalent cyclic group; R¹ represents a hydrogen atom or a methyl group; R¹⁷ represents a hydrogen atom, a chain, a branched or a cyclic alkyloxymethyl group having 1 to 15 carbons; and h and j respectively, are integers from 1 to 5; and i is an integer of 1 or 2.

18. (New) The positive-type resist composition for liquid immersion lithography according to Claim 14, wherein a cyclic group in the constitutional unit (a1) is an aliphatic cyclic group.

19. (New) The resist composition for liquid immersion lithography according to Claim 18, wherein the alicyclic group is a polycyclic aliphatic hydrocarbon group.

20. (New) The resist composition for liquid immersion lithography according to Claim 19, wherein the polycyclic aliphatic hydrocarbon group is a norbolinyl group.

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21. (New) The resist composition for liquid immersion lithography according to Claim 14, wherein an acid dissociable, dissolution inhibiting group in the constitutional unit (a2) is a polycyclic aliphatic hydrocarbon group.

22. (New) The resist composition for liquid immersion lithography according to Claim 21, wherein the polycyclic aliphatic hydrocarbon group is an adamanyl group.

23. (New) The resist composition for liquid immersion lithography according to Claim 14, wherein a medium for liquid immersion lithography is water.

24. (New) A method for forming a resist pattern using a liquid immersion lithography process comprising the steps of:

 forming a photoresist film onto a substrate by using at least the positive-type resist composition according to Claim 14;

 disposing an immersion solvent onto the substrate on which the resist film is laminated;

 selectively exposing the resist film via the immersion fluid;

 conducting a heat process as required; and

 developing the resist film.